PCT/NZ01/00176

Intellectual Property Office of New Zealand

CERTIFICATE

This certificate is issued in support of an application for Patent registration in a country outside New Zealand pursuant to the Patents Act 1953 and the Regulations thereunder.

I hereby certify that annexed is a true copy of the Provisional Specification as filed on 31 August 2000 with an application for Letters Patent number 506684 made by CO2 PAC LIMITED.

Dated 3 September 2001.

PRIORITY DOCUMENT
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Neville Harris
Commissioner of Patents

506684

Patents Form No. 4 Our Ref: MH503095

Patents Act 1953

PROVISIONAL SPECIFICATION

SEMI-RIGID COLLAPSIBLE CONTAINER

We, **CO2 PAC LIMITED**, a New Zealand company, of 88-90 Balmoral Road, Mt Eden, Auckland, New Zealand, do hereby declare this invention to be described in the following statement:

MH:VO:PT0440050

SEMI-RIGID COLLAPSIBLE CONTAINER

BACKGROUND TO INVENTION

This invention relates to polyester containers, particularly semi-rigid collapsible containers capable of being filled with hot liquid, and more particularly to an improved construction for initiating collapse in such containers.

'Hot-Fill' applications impose significant mechanical stress on a container structure. The thin sidewall construction of a conventional container deforms or collapses as the internal container pressure falls following capping because of the subsequent cooling of the liquid contents. Various methods have been devised to sustain such internal pressure change while maintaining a controlled configuration.

Generally, the polyester must be heat-treated to induce molecular changes resulting in a container that exhibits thermal stability. In addition, the structure of the container must be designed to allow sections, or panels, to 'flex' inwardly to vent the internal vacuum and so prevent excess force being applied to the container structure. The amount of 'flex' available in each panel is limited, however, and as the limit is reached the force is transferred to the sidewall, and in particular the areas between the panels, of the container causing them to fail under any increased load.

Additionally, vacuum force is required in order to flex the panels inwardly to accomplish pressure stabilization. Therefore, even if the panels are designed to be extremely flexible and efficient, force will still be exerted on the container structure to some degree.

The principal mode of failure in all prior art is non-recoverable buckling, due to weakness in the structural geometry of the container, when the weight of the container is lowered for commercial advantage. Many attempts to solve this problem have been directed to adding reinforcements to the container sidewall or to the panels themselves.

In our New Zealand Patent 240448 entitled "Collapsible Container", a semi-rigid collapsible container is described and claimed in which controlled collapsing is achieved by a plurality of arced panels which are able to resist expansion from internal pressure, but are able to expand transversely to enable collapsing of a folding portion under a longitudinal collapsing force.

SUMMARY OF THE INVENTION

According to one aspect of this invention there is provided a semi-rigid container, a side- wall of which has a folding section including an initiator section and also a control section that resists being expanded from the collapsed state.

Further aspects will become apparent from the following description.

DESCRIPTION OF DRAWINGS

Figure 1: shows diagrammatically a semi-rigid collapsible container according to one possible embodiment of the invention in its pre-collapsed condition;

Figure 2: shows the container of Figure 1 in its collapsed condition;

Figure 3: very diagrammatically shows a cross-sectional view of the container of Figure 2 along the arrows A-A; and

Figure 4: shows the container of Figure 1 along arrows A-A.

DESCRIPTION OF POSSIBLE EMBODIMENT

The present invention relates to a container of any required shape or size and made from any suitable material and by any suitable technique. However, a plastics container blow moulded from polyethylene tetraphalate (PET) may be particularly preferred.

One possible design of semi-rigid container is shown in the accompanying drawings. The container referenced generally by arrow 1 is shown with an open neck portion 4 leading to a bulbous top portion 5, a central portion, a lower portion 7 and a base 8.

An initiator portion 1 may be capable of flexing inwardly under low vacuum force while the initiator portion 1 causes a more steeply inclined controlled portion 2 to invert and flex further inwardly into the container 10.

The provision of an initiator portion 1 allows for a steep angle to be utilised in the control portion 2. Without an initiator portion 1, the level of force needed to invert the control portion 2 may be undesirably raised. This enables strong resistance to expansion from the collapsed state of the bottle 1. This causes far greater evacuation of volume

without increased internal vacuum force than from prior art vacuum panels. Vacuum pressure is subsequently reduced to a greater degree than prior art proposals causing less stress to be applied to the container side walls.

Moreover, when the vacuum pressure is adjusted following application of a cap to the neck portion 4 of the container 10 and subsequent cooling of the container contents, it is possible for the collapsing section to cause ambient or even raised pressure conditions inside the container 10.

This increased venting of vacuum pressure provides advantageously for less force to be transmitted to the side walls of the container 10. This allows for less material to be necessarily utilised in the construction of the container 10 making production cheaper. This also allows for less failure under load of the container 10, and there is much less requirement for panel area to be necessarily deployed in a design of a hot fill containers, such as container 10. Consequently, this allows for the provision of other more aesthetically pleasing designs to be employed in container design for hot fill applications.

In a particular embodiment of the present invention, support structures 3 may be provided around the central portion 6 so that as seen particularly in Figures 2 and 3 with the control portion 2 collapsed, it may ultimately rest in close association with the support structures 3 in order to maintain top-load capabilities, as shown at 3b in Figure 3.

Where in the foregoing description, reference has been made to specific components or integers of the invention having known equivalents then such equivalents are herein incorporated as if individually set forth.

Although this invention has been described by way of example and with reference to possible embodiments thereof, it is to be understood that modifications or improvements may be made thereto without departing from the scope or spirit of the invention.

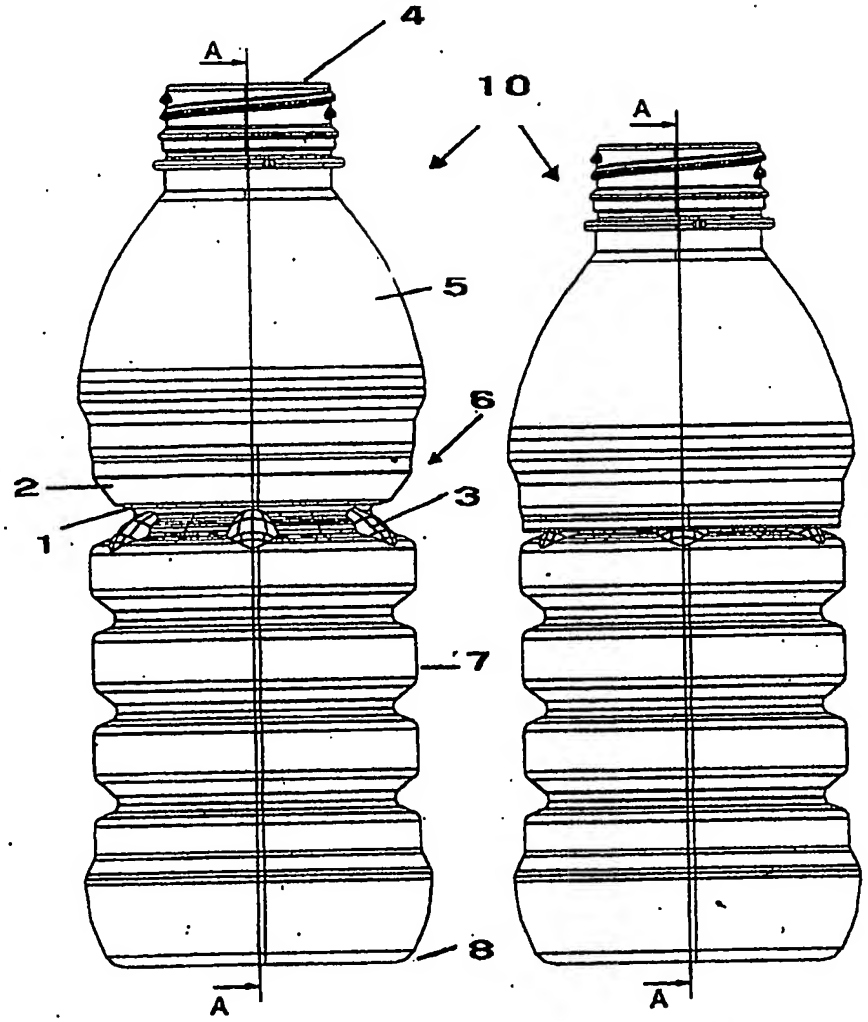

FIG. 1

FIG. 2

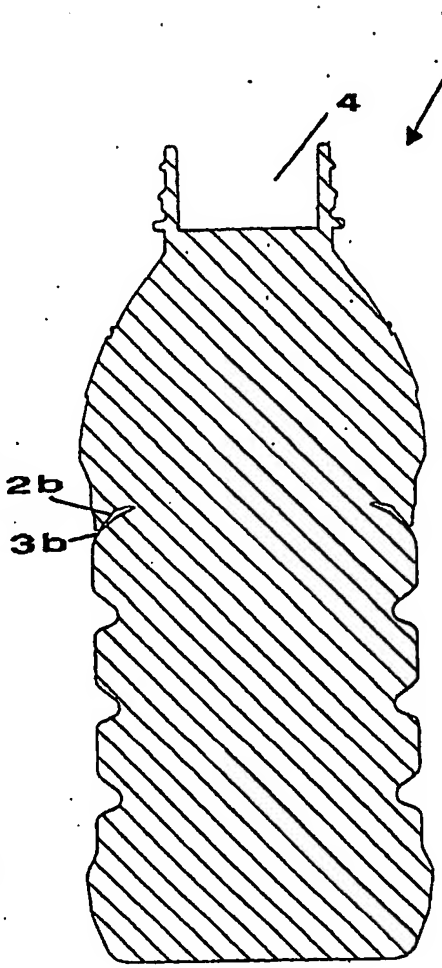

FIG. 3

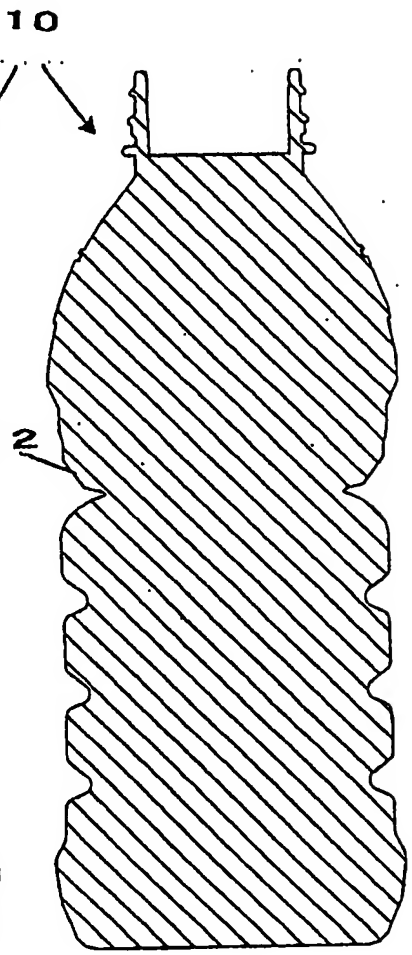

FIG. 4